

State & Regional Success – How We're Supporting the National Effort (The Business of CHP)

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Developing the Business Case

- **Step #1: Targeted Audience**
- **Step #2: Address Technical Risk**
- **Step #3: Address Economic Viability**
- **Step #4: Regulatory / Local Climate**
- **Step #5: Case Studies / Project Profiles**

Step #1: Targeted Audience

- **One Day Workshops Aimed at Specific Market Sectors**
- **Address Key Decision Makers**
 - **Facility / Energy Managers**
 - **Financial Officers**
- **Objective / Bottom Line:**
 - **Does CHP Make Sense In My Facility and How Do I Answer That Question?**

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- **Full Gamut of Targeted Workshops / Courses**
 - Ethanol Industry
 - Biomass (Swine)
 - State Regulators
 - Hotels
 - Hospital / Healthcare
 - K thru 12 Schools
 - A/E Firms
 - Industrial Firms
 - Industrial Assessment Centers

Step #2: Address Technical Risk

- **CHP is a Low Technical Risk, Provided You:**
 - Utilize Proven Technologies
 - Utilize Good Engineering Design Practices
 - Follow Prescribed Maintenance Practices
- **CHP – The Concept**
 - Definitions
 - Advantages / Issues
 - Technologies

Step #3: Address Economic Viability

- **Natural Gas Is Still the Most Common Fuel Of Choice For CHP (much tougher sell)**
 - High Gas Prices ---- Smaller Spark Spreads
 - Gas Price Volatility --- Uncertainty
 - Future Electric Prices --- Uncertainty
- **Approach:**
 - Standard Calculation / Estimate of Energy and Utility Bill Savings
 - Sensitivity Analysis Based On Varying Both the Natural Gas & Electric Prices

Approach (cont'd)

- Investigate “Opportunity Fuels” When Applicable
- Identify and Quantify Other Benefits Specific to the Targeted Market Sector:
 - » Voltage Sags / Instantaneous Outages
 - » Emission Controls (VOCs)
 - » Riding Thru Blackouts
 - » Energy Security
 - » Quality Power Requirements
- Financing Options

Step #4: Regulatory & Local Climate

- **How Approachable and Cooperative Is the Local Electric Utility?**
- **What Are the Grid Interconnect Rules, Standby Charges, Peak / Off-Peak Rates, Buyback Rates?**
- **How Favorable Are the Local and State Agencies (including the utility commissions)?**
- **Where Can They Get Assistance for the Next Steps?**

Step #5: Case Studies / Project Profiles

- **Identify Where Similar Companies / Facilities Have Invested In CHP**
- **Develop Project Profiles On Those CHP Installations**
- **Workshop Panel Discussion With Colleagues That Have CHP Experience**

Beloit Fact Sheet



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A Division of
Fairbanks Morse

Beloit Memorial Hospital 3.0 MW CHP Application

Project Profile

combined heat & power in healthcare

Quick Facts

Location:
Beloit, Wisconsin

Facility Size:
350,000 square feet
197 beds

Generating Equipment:
Two (2) 3.0 MW Fairbanks Morse
Fast Fuel Engines (Domestic)
Annual Energy Savings:
\$223,000

Equipment Cost:
\$1.25 Million

Estimated Payback:
5.4 Years

Begin Operation:
June 1, 2002

Reasons for CHP

"Upgrade Energy Distribution"
"Future Deregulation"


In general, hospitals are excellent candidates for CHP applications because they usually operate 24 hours-a-day, year-round, creating fairly consistent electric and thermal loads plus high thermal loads. Beloit Memorial Hospital proved a viable candidate for CHP and replaced its existing emergency generation and heating and cooling equipment with the CHP plant. The system now serves both 24 day-to-day CHP operation and 21 emergency power. Affiant (local utility) financed part of project with a low interest rate.

Future Deregulation
IDH managed to reduce the impact of higher energy costs and susceptibility to power quality issues, especially those which could occur when deregulation becomes a reality.

Additional Electricity
Generated electricity not needed by the hospital (up to 3.5 megawatts) is sold to the local utility. This power beneficial to the local utility during high peak demand periods and/or when generating capacity is reduced due to equipment problems and/or maintenance.

Project Overview

In the late 1990's, Beloit Memorial Hospital of Beloit, Wisconsin, was faced with the need to upgrade its electrical distribution system and to address other energy capacity issues that developed over the years since opening in 1979. Instead of simply upgrading and/or replacing the existing equipment, Beloit Memorial Hospital (IDH) decided to install a Combined Heat and Power (CHP) Plant, which also helped reduce annual energy costs. The 3.0 megawatt CHP plant provides maximum flexibility to both the hospital and the local electric and gas utility company, in regards to electricity, heating, air conditioning, and hot water usage.





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CHP System Equipment

- 2 Fairbanks Morse dual fuel 900 HP, 1,500 KW engine generator sets
- One 6000 AMP circuit breaker and two 3000 AMP, 480V and a generator breaker
- One 12.5V main service breaker
- One 424-BT Caterpillar single stage hot water absorption chiller
- 7.66 MBR/hr shell and tube heat exchanger (backup for recovered heat)
- 6.735 MBR/hr Sander plate and frame heat exchanger
- 6.149 MBR/hr Sander domestic hot water heat exchanger
- 2 Cuts 2,359 MBR/hr generator set framed tube heat recovery coils
- 2 outdoor exhaust heat rejection radiators

CHP Operation

The CHP plant actually operates from approximately 8:00AM to 10:00PM Monday through Friday, 52 weeks per year. The system supplies all domestic hot water during on-peak hours and the engines always start-up on diesel, switching over to natural gas when load reaches 10%.



Scope of Project

Edlund Engineering completed the design and construction of the 3.0 MW CHP Plant involving around three 16 major features:

- Remove and replace old emergency generation
- Provide 1.5 MW power to hospital
- Export 1.5 MW power to local utility
- Provide heat to drive 400-ton absorption chiller or facility's heating loop
- Provide heat for domestic hot water
- Install system to operate via natural gas or diesel gas in event of emergency
- Provide instantaneous power in the event of a utility failure
- Provide the utility company with an "on-call" system to reduce utility load on grid short falls
- Maintain entire CHP system at 68.8% efficiency
- Remove/replace older 12.5V cables

Additional Facts

- The total project cost of upgrading and replacing the existing electrical distribution equipment and installing the CHP equipment was \$3 million
- Breakdown point before natural gas price was too high price of was \$9.64/MBtu
- Heat recovery savings were 1.66 - 1.54 \$/MWh
- Fairbanks Morse engines met 10 second start-up time requirements for emergency power generation approved by the Wisconsin's Department of Health and Family Services

CHP plant reduces impact of higher energy costs and power quality issues towards future deregulation

Dual fuel Fairbanks Morse engines meet WI DHS emergency power and CHP requirements

\$223,000 Annual Energy Savings



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Midwest CHP Application Center

- **U.S. DOE Sponsored Center With Support From The Eight Midwest States**
- **Initiated In March 2001**
- **Service Area Includes:**
 - Illinois - Minnesota
 - Indiana - Missouri
 - Iowa - Ohio
 - Michigan - Wisconsin
- **Close Coordination With The Midwest CHP Initiative**



Midwest CHP Application Center

- **Application Experience:**

- Hospitals/Healthcare - Colleges
- High Schools - Industrial Plants
- Casinos - Museums
- Hotels - Airport
- Office Buildings - Ethanol Plants
- 911 Emergency Centers

Midwest CHP Application Center

- **Specialty Reports / Studies**
 - Emissions Guidebook
 - CHP Resource Guidebook
 - Midwest CHP Roadmap Report
 - State Baseline Characterization Reports
 - State Hospital Characterization Reports

For Further Information

- **Midwest CHP Application Center**

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